



**AmbiCom WL11-SD
Wireless LAN SD Card**

User Manual

**Version 3.0
October 15, 2004**

Table of Contents

1	WL11-SD features	3
2	Package Contents & System Requirements	3
2.1	Package Contents	3
2.2	System Requirements	3
2.2.1	Win-CE based PDAs (Pocket PC Device)	3
3	Introducing WL11-SD Card	3
3.1	WL11-SD client features and benefits	3
3.2	WL11-SD Wireless Network Scenarios.....	4
3.2.1	Peer-to-Peer (Ad-Hoc) Workgroup	4
3.2.2	Home Networking.....	4
3.2.3	Enterprise Networking.....	5
3.3	About the WL11-SD CD-ROM.....	5
4	Installing your WL11-SD Client Driver	5
4.1	Installation of the WL11-SD driver to the Pocket PC...	5
5	WL11-SD Configuration Utility	8
5.1	Basic Setup.....	8
5.2	Advanced Setup	9
5.2.1	Status.....	10
5.2.2	Wireless Network Information	11
5.2.3	Advance.....	13
5.2.4	About	14
6	Connect Network with Microsoft Zero Configuration ..	14
6.1	Basic configuration.....	14
6.2	WPA and 802.1x Authentication Configuration.....	18
7	Troubleshooting	27

1 WL11-SD features

The ***AmbiCom Wireless SD Card*** conveniently connects your PDA to an existing wireless network without cables or wires. In addition to the slim and ultra light weight SD design, the Wireless SD Card also features secure data transfer, full privacy exceptional range and data rate, as well as meets Wi-Fi certification standards for total interoperability with other 802.11b or 802.11g equipment.

2 Package Contents & System Requirements

2.1 Package Contents



- One AmbiCom WL11-SD (Wireless LAN card)
- One User Manual, Drivers and Configuration utility CD-ROM
- Quick Installation Guide

If you miss any of these items please contact your reseller

2.2 System Requirements

2.2.1 Win-CE based PDAs (Pocket PC Device)

- PDA with Windows Pocket PC 2002 and Windows Mobile 2003 with at least 32 MB memory.
- Secure Digital I/O (SDIO) capable slot, check with your PDA manual or manufacturer. Go to www.ambicom.com for PDA compatibility.
- Microsoft Active Sync should be installed.
- A standard 802.11b or 802.11g Wi- Fi approved Access Point (AP)/Base station.

3 Introducing WL11-SD Card

3.1 WL11-SD client features and benefits

The WL11-SD Client is a wireless network card that complies with the IEEE 802.11b standard on wireless LANs.

- Supports data rates up to 11 Mbps.

- Compatible with wireless LAN system based on Direct Sequence Spread Spectrum (DSSS) radio technology that complies with the "IEEE 802.11b standard on wireless LANs".
- Support Ad hoc and Infrastructure modes for easy wireless communication.
- Automatic Transmit Rate Select mechanism in the transmit range of 11, 5.5, 2 and 1 Mbps.
- Supports Advanced Security 128 bit Wired Equivalent Privacy (WEP) data encryption, 802.1X and WPA.

Note:

- * **WPA security is only support on Windows Mobile 2003 Second Edition**
- * **802.1x and WPA are not supported on CD V3.0 of software on ETSI Domain.**

- Efficient Power Management.
- Roaming over multiple channels.
- Working range up to 400 meters in an open environment and 100 meters in a close environment.

3.2 WL11-SD Wireless Network Scenarios

The WL11-SD Client enables you to:

- Connect your computer to a Peer- to- Peer workgroup of wireless computing devices.
- Connect your computer to a Small Office/Home Office (SOHO) network or Wireless Hot Spot that has Wi- Fi Access Points.
- Connect your computer to a Local Area Network (LAN) Infrastructure.

3.2.1 Peer-to-Peer (Ad-Hoc) Workgroup

The Peer-to-Peer workgroup configuration enables you to quickly set up a small wireless workgroup, where the workgroup participants can exchange files using features like "Files and Printer Sharing" as supported by Microsoft Networking.

You can use this option to setup a temporary or ad-hoc network in environments where no access points are available (for example in Small Office/Home Office (SOHO) environments). As long as the stations are within range of one another, this is the easiest and least expensive way to set up a wireless network.

3.2.2 Home Networking

With AmbiCom's WL11-SD, wireless access to the Internet or other devices is at your fingertips. All you need to do is connect the WL11-SD to an existing

Access Point or Router that may be connected to the broadband or dial-up connection or Wireless Hot Spot and now you are ready to:

- Share files and printers*
- Access the Internet
- Listen to internet radio
- Watching online movie
- Reading and replying email
- And more

* Some application might require installing third party software; see your PDA operating manual

3.2.3 Enterprise Networking

With the Wi-Fi certified Access Point in the corporate network system, you can connect to a corporate Local Area Network (LAN) infrastructure to have wireless access to all network facilities. LAN Infrastructures may either be□

- Stand- alone wireless LANs*
- Wireless network infrastructures connected to an existing Ethernet network.

* Some application might require installing third party software; see your PDA operating manual

3.3 About the WL11-SD CD-ROM

The WL11-SD CD-ROM contains both software and documentation for the WL11-SD card. If you wish to install the WL11-SD driver software, turn to Section 4 "Installing your WL11-SD Client Driver" and follow the instruction.

4 Installing your WL11-SD Client Driver

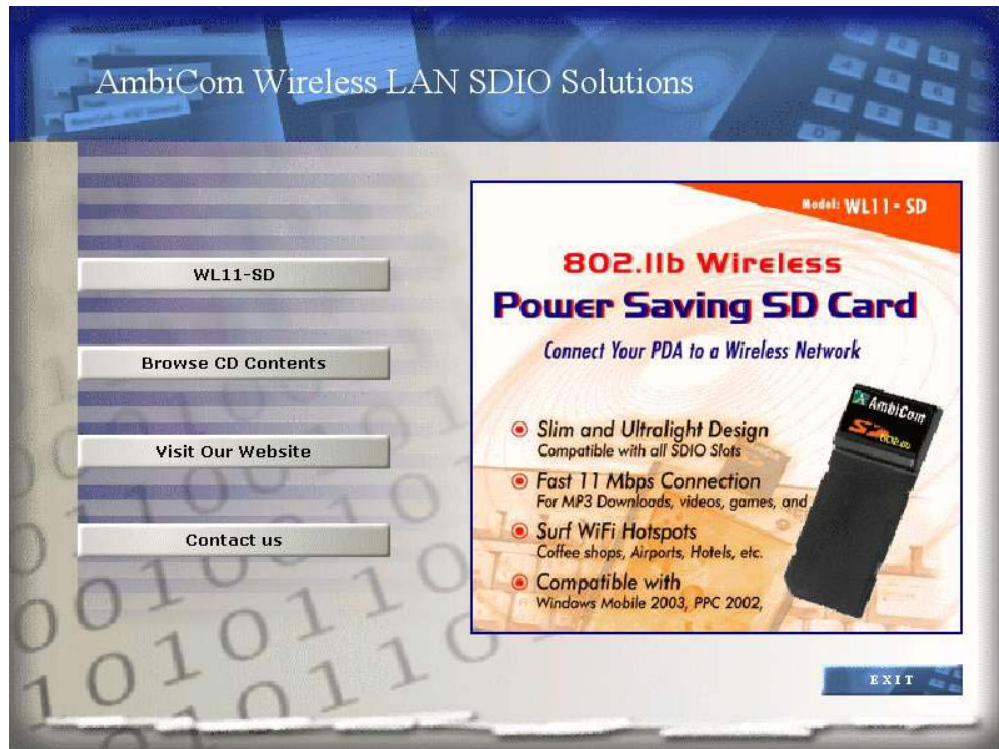
4.1 Installation of the WL11-SD driver to the Pocket PC

- Connect your PDA to your computer and make sure ActiveSync has established for a connection between the two devices.
- Insert the WL11-SD Setup CD into your CD-ROM. The following Installation wizard will pop up to guide you through the process.

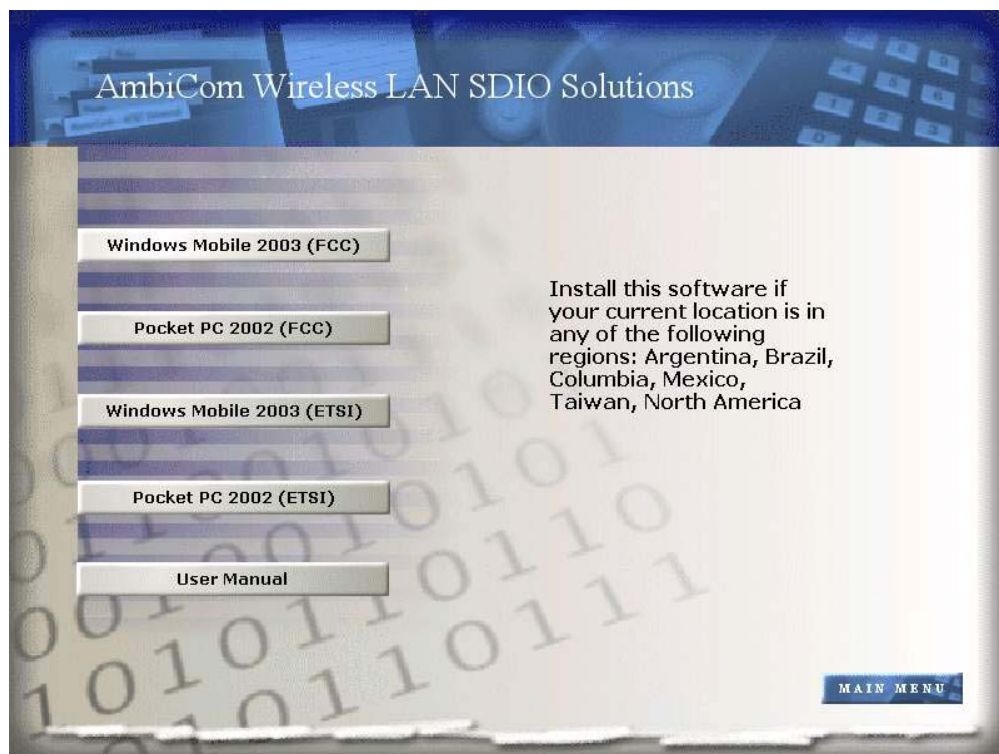
Unless you have deactivated the auto-run feature in Windows, the following screen should appear automatically.

If this screen does not appear automatically, you can access the installation program by clicking the **Start** button and selecting **Run**. In the drop down box provided, type "**D:\ Setup.exe**" ("D" represents the CD-ROM drive).

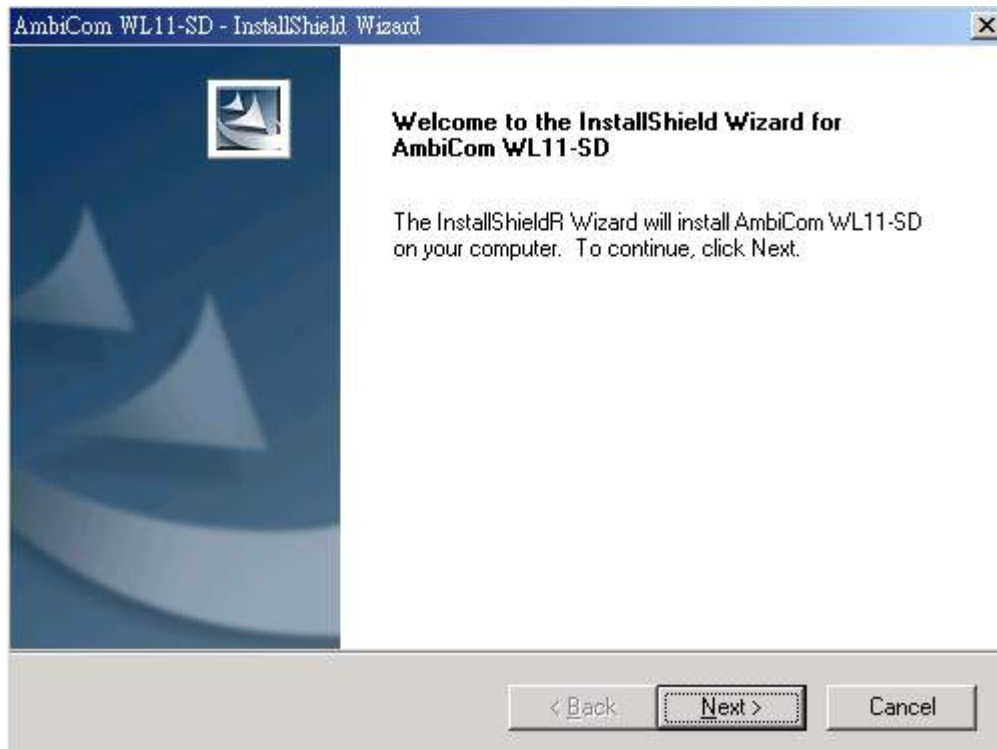
- Click **WL11-SD** to start your installation.



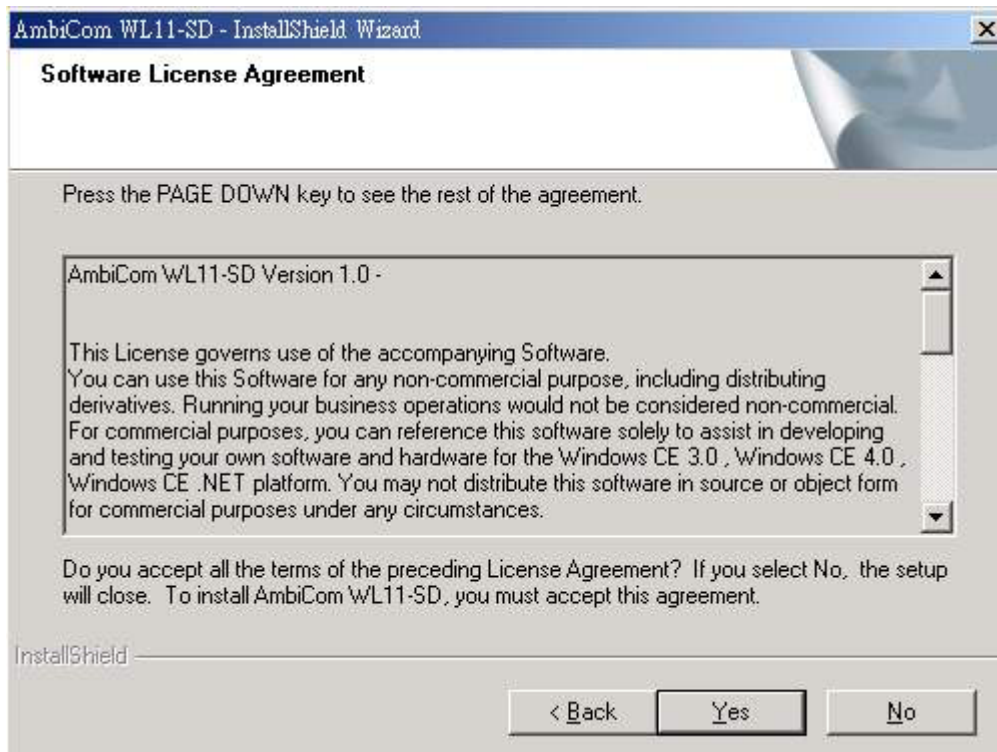
- Please select the appropriate operating system and region.



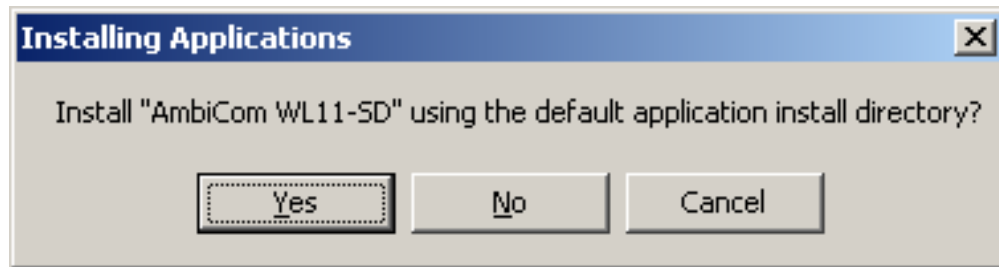
- Click **Next**.



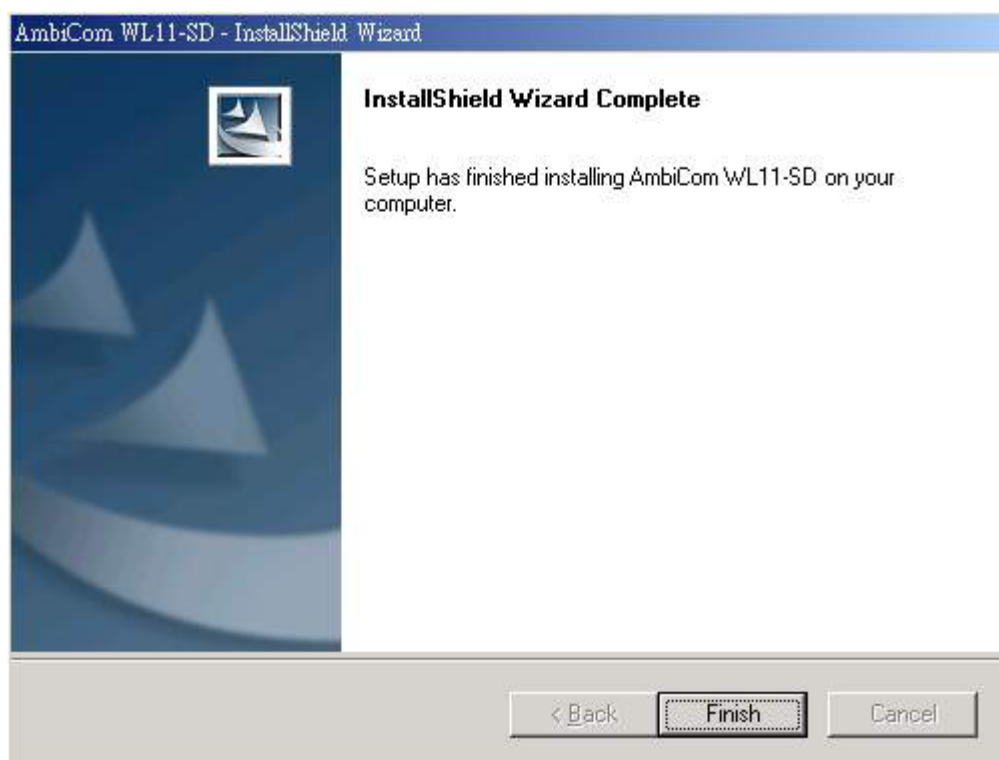
- Click **YES**. You will see the following Windows.



- Click **YES** to accept the installation. Continue follow the installation wizard.






- Click **Finish** to complete the driver installation.



5 WL11-SD Configuration Utility


5.1 Basic Setup

When WL11-SD card is inserted, it should connect to the available Access Point (AP) automatically. If more than one AP is available then the Wireless SD should connect to the AP, which has stronger signal strength. When the driver is loaded and if it is working normally an Icon  is displayed on the lower right of the PDA screen. Once it is observed, now you are ready to connect to the Internet. Other icons have different meaning and they are:

-  Icon indicates the network is not established.
-  Icon indicates that the card is scanning for the nearest AP.



5.2 Advanced Setup

If specific wireless network setup is required, tap the icon,  to access the pop-up utility shown below.



Figures 1. Top Menu.

The menu options are:

- **Radio on**
- **Radio off**
- **Status**
- **Wireless Network**
- **Advanced Options**
- **About**

Radio on: Turns the wireless radio on. LED of the card will be flickering for few seconds to establish the connection.

Radio off: Turns off the radio. A pop-up Windows will ask for your confirmation. If confirmed, the Status Icon will be changed to look like this  Then WL11-SD card will stop functioning.

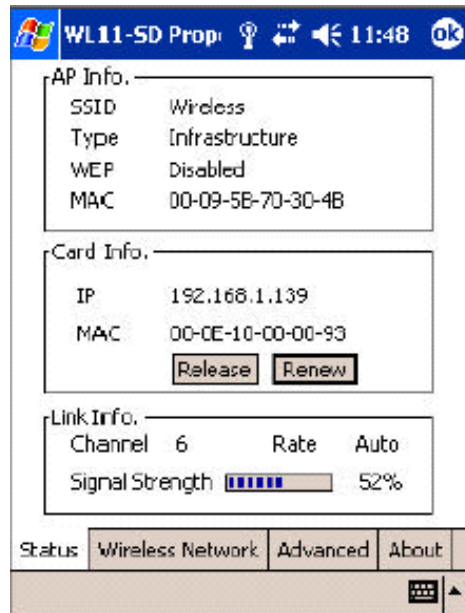
Status: Shows the current wireless network status like shown in figure 2. The status screen also shows parameters about the wireless connection.

Wireless Network: Shows the currently available networks in Figure 3.
Note: Wireless Network is only shown on old version of software on ETSI Domain.

Advanced Options: Show the advanced configuration such as WEP and power save mode in Figure 6.

About: Shows the driver version and the setup utility software version in Figure 7

5.2.1 Status



Figures 2. Status and Information

AP INFO: Shows the current access point relevant information.

SSID: Shows the current access point name (ESS ID).

Type: Shows the current connection mode.

WEP (Wired Equivalent Privacy): shows the current WEP used in the AP. WEP can be enabled or disabled.

MAC: Shows the AP's MAC address that this card is communicating.

CARD INFO: Shows the information about WL11-SD card inserted such as,
IP: IP address of the card,

MAC: MAC address of the card.

Release Button: Releases the Current IP address

Renew Button: Renews the IP address

LINK INFO: Shows the current wireless link information

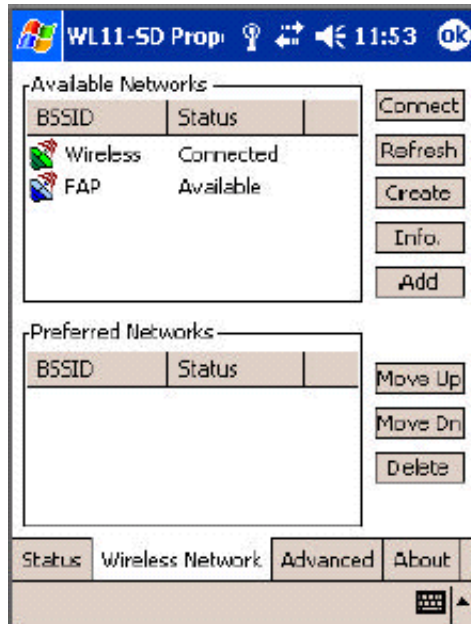
Channel: Shows the wireless radio channel currently used by the card.

Rate: Shows the current transmit rate. This can be 1 Mbps, 2 Mbps, 5.5 Mbps, or 11 Mbps. Auto is automatic selection.

Signal Strength: Gives signal strength of the received signal.

Wireless Network: Shows wireless networks available in the neighborhood. It is shown like below.

5.2.2 Wireless Network Information



Figures 3. Wireless Network Information

Available Networks: Displays all the active AP's in the neighborhood. The communicating AP currently is first.

Connect Button: Selects an AP and connect to the AP. Once the connection is established the AP requires user's information and the figure 4 Windows will appear.

Users must input required WEP key and click **Connect** to communicate. If multiple WEP keys are required, the index will show the requirement. If no WEP input is required, click **Connect** to connect without inputting the WEP key. Once **Connect** button is pressed, figure 5 Windows will popup.

Refresh Button: Starts a new search for all available APs or peer-to-peer stations in the vicinity.

Create Button: Creates a new network and it will open the Windows shown below. The user has to input all the information that is required to create new wireless network (e.g. Ad-hoc Network).

Info Button: Selects an AP and its relevant information regarding the AP.

Add Button: Adds the currently selected AP from the **Available Networks** to **Preferred Networks**.

The user can also select an AP from the **preferred Networks** list. Once this is set, user can use the same name for quick connection or it is connected automatically.

Preferred Networks: Displays the preferred wireless networks available.

Move Up: Moves the highlighted profile one line up to increase the association priority.

Move Down: Moves the highlighted profile one line down to decrease the association priority.

Delete: Deletes the selected profile.

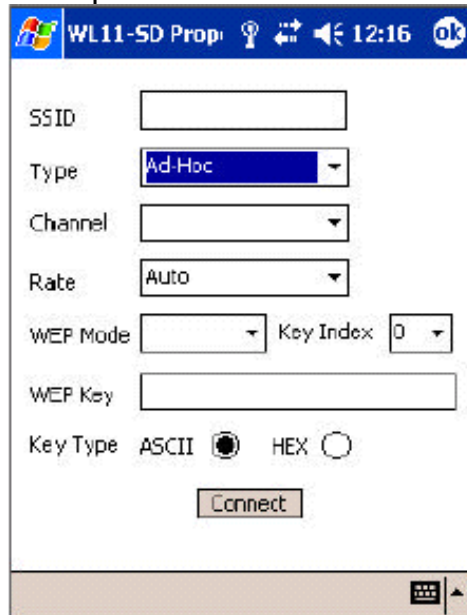


Figure 4. Connect Windows

SSID: Enters the SSID, this can be the Network ID or Access Point name.

Type: Network type; either **Ad-Hoc** or **Infrastructure** will be selected.

Note: Ad-Hoc (or Peer-to-Peer) mode is connection between two or more cards. **Infrastructure** mode is connection between clients and an AP.

Channel: In Ad-hoc mode, select the channel in which user wants to create/join the network.

In infrastructure mode, user can leave it blank or can enter AP's channel number. The default is auto.

Rate: Sets the transmission data rate in the pull down menu. The default is **auto**, which defines the rate automatically.

WEP: Selects either **enabled** or **disabled** of the data encryption. The default is **disabled**.

WEP Key

When WEP mode is **enabled**, the user needs to enter WEP key as shown.

64 bit (HEX) Maximum of 10 characters in Hexadecimal format

64 bit (ASCII) Maximum of 5 characters in ASCII format

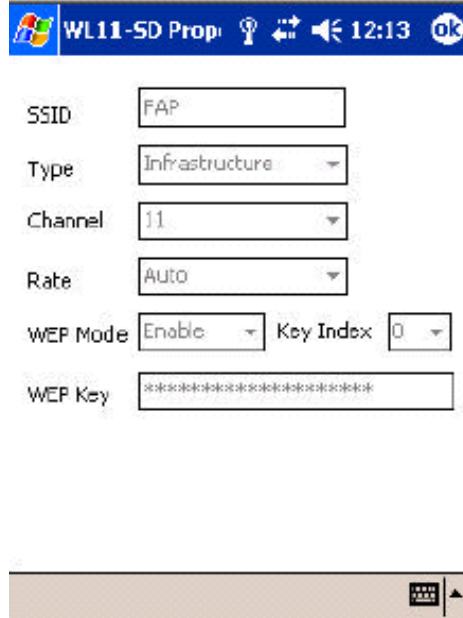
128 bit (HEX) Maximum of 26 characters in Hexadecimal format

128 bit (ASCII) Maximum of 13 characters in ASCII format

Key Index: Allows selecting multiple WEP keys

Click **Connect** button after entering all the necessary info to create new wireless network

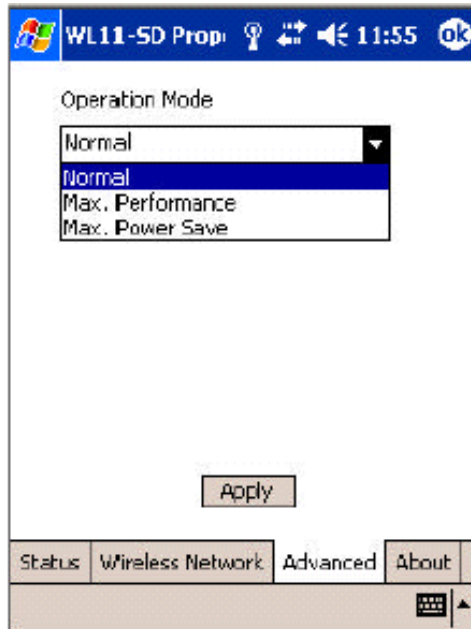
Click on **Info** button will bring up the following Windows Figures 5.



Figures 5. Connected network information

5.2.3 Advance

Advanced Options: shows advanced configuration settings available for WL11-SD card.



Figures 6. Advanced setup configuration

Operation Mode: Shows three different operational options depending on applications.

Normal: This is the default mode and power level and performance level are automatically selected.

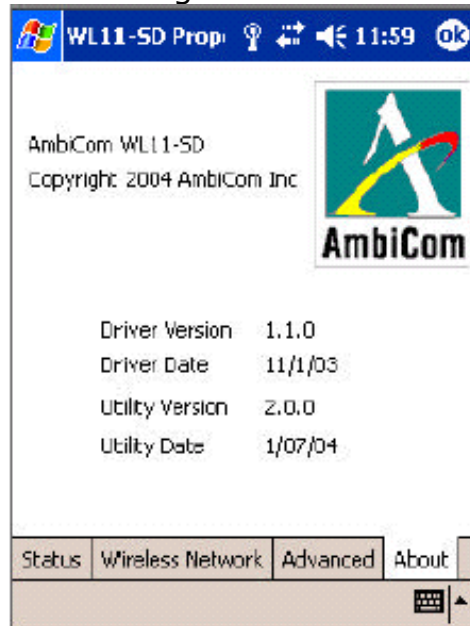
Max Power Save: This option will give the best power savings but less emphasis on the performance.

Max performance: This option will give the best performance.

User can change the settings by clicking **Apply** button.







5.2.4 About

About page content is shown in Figures 7.



Figures 7. WL11-SD card version information

Summary of Important Icons

-  Icon indicates the current AP is connected
-  Icon indicates the current AP is available for wireless connection
-  Icon indicates the current AP is not available for wireless connection
-  Icon indicates Ad-hoc mode is off with current wireless connection
-  Icon indicates Ad-hoc mode is on with current wireless connection
-  Icon indicates Ad-hoc mode is established with current wireless connection

6 Connect Network with Microsoft Zero Configuration

6.1 Basic configuration

The Wireless Zero Configuration utility for Windows Mobile 2003 makes it easy to connect to WLAN networks, including WPA and 802.1x. To learn about the utility, refer to your Windows Mobile 2003 manual. For help, tap **Start → Help**.

Whenever you insert the AmbiCom WL11-SD card, the driver is loaded. The driver starts with loading/initialization of the card type. After it is completed

show in Figures 8 and 9 appear. You can choose the AP they want to connect to.



Figures 8




Figures 9

Note: In most cases, you should choose **The Internet**. If your network uses a VPN/proxy server, refer to the Windows Mobile 2003 manual for instructions.

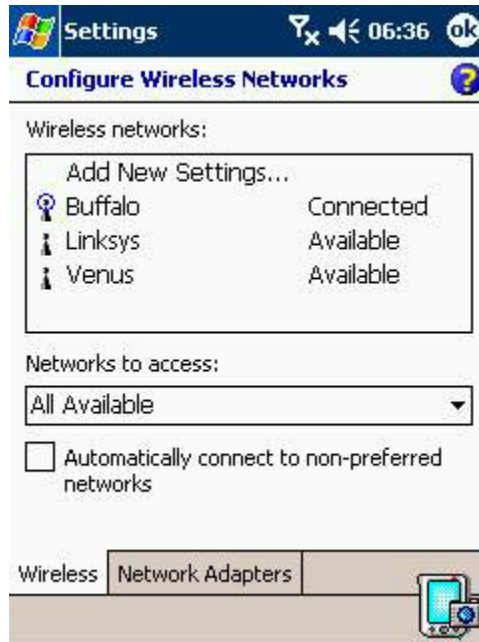
A Network (WEP) Windows will appear that will allow you to enter a WEP key if required.



Note: You can enter the key in hexadecimal or ASCII format.

When you have connected, the "x" will disappear from the connection icon at the top of the screen 

The Network setting can be seen by going to Settings→Connections, select Connections icons, then select Advanced, Network Card, like Figures 10.

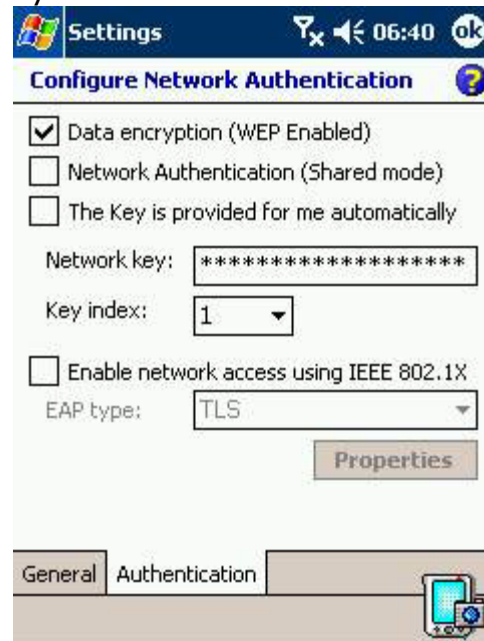


Figures 10

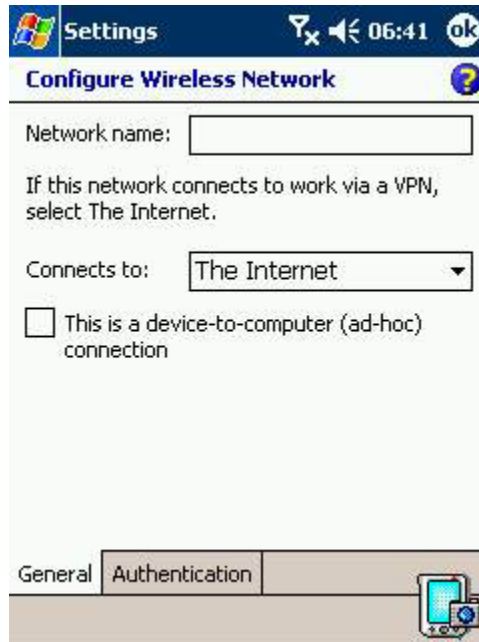
AP can be added by clicking "Add New" in Figure 10. A Windows popped up as shown in Figure 13. Otherwise AP "Buffalo" can be selected by clicking on it. Another set of menu popped up: General, Network Key, and 802.1x. They are shown in Figures 11, and 12 respectively.



Figures 11



Figures 12

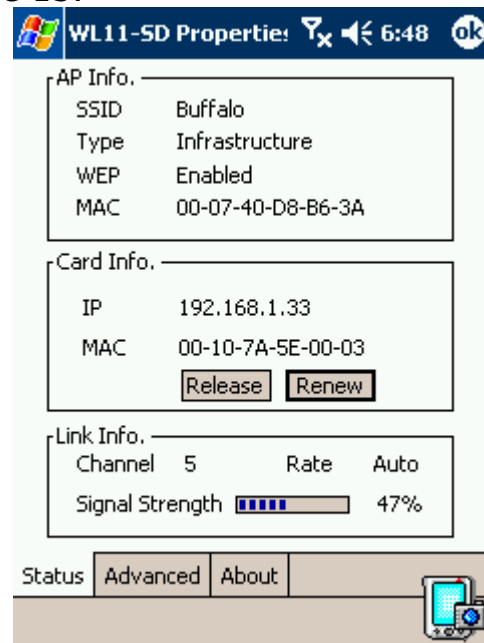


Figures 13

The connected AP "Buffalo" can be verified further. A green icon should come up at the bottom showing that an AP is connected, as shown in Figure 14. This should happen right after "Buffalo" is selected and connected. The Status menu in the GUI is shown in Figure 15.



Figures 14



Figures 15

6.2 WPA and 802.1x Authentication Configuration

This section explains how to use the SDIO WLAN Card with Windows Mobile 2003 to connect to WPA or 802.1x network. Before you try to connect, be sure to install software and insert the card.

1. Prepare Network Information

Verify Card and Network Compatibility

WLAN SD card cannot connect to an 802.1x network unless the network satisfies the four requirements below. Consult with your network administrator.

- Windows Internet Information Service (IIS)
- Windows Internet Authentication Service (IAS)
- Windows Certification Authority (CA) with automatic approval and correct Pocket PC certificate format (via MS certificate template)
- Access point configured only for 802.1x (i.e., no multi-mode support or static 128-bit WEP keys)

Note: For more information, please refer to

<http://www.microsoft.com/Windowsserver2003/technologies/default.mspx>

Prepare Security Settings

If the network is compatible, ask the administrator for necessary security settings:

- Wireless network name, known as ESSID or SSID (case sensitive)
- Authentication type, user name, password
- Use of either DHCP or Static IP to assign IP addresses
- Authentication permission restrictions (e.g., domain administrators only)

Note: If your network only allows domain administrators to authenticate, ask your network administrator to assign you this privilege.

Obtain 802.1x Certificate(s)

Ask the administrator for a copy of the root certificate from a Trusted Root Authority (no intermediary authority).

EAP-TLS only: You also need to set up a cabled connection to the network to install a personal certificate.

2. 802.1x Networks for Windows Mobile 2003

Here is the setup for the Wireless Network PC Card under Windows Mobile 2003.

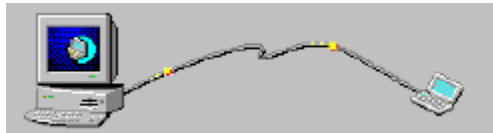
2.1 Install 802.1x Certificates

If your network uses EAP-TLS authentication, you also need to install a user (client) certificate. There are three primary methods for installing a user

certificate: using auto-enrollment, importing a certificate file, and using Internet Explorer and web enrollment to request a certificate from a Certificate Authority (CA). Consult with your network administrator for instructions. For more information, please refer to <http://www.microsoft.com/>.

Web enrollment on Windows 2000/2003 uses ActiveX, which is only supported by desktop Windows versions. Microsoft has come up with the following solution for Pocket PC: a separate ENROLL program for PPC which sends a certificate request to the webserver and retrieves the certificate from it after the CA has issued it. The procedure is as follows:

- A. Download the ENROLL program form PDA manufacturer Web site.
- B. Make an active connection between your Pocket PC and host PC. Use ActiveSync and a serial/USB/Ethernet cable or cradle.



- C. Use **My Computer** or **Windows Explorer** to access your **Mobile Device** and copy the ENROLL.EXE and ENROLL.CFG into the **MY Documents** folder of the Pocket PC.



- D. Edit the ENROLL.CFG file: change the server address and enter Windows 2000/2003's server name/IP address. Also enter the name and password of the user account on the Windows 2000/2003 server (will be sent unencrypted (!) over the network so that the rightful owner obtains the certificate).
- E. Run **ENROLL.EXE**.

- F. Enter the **User**, **Password**, and **Server** information as supplied by your network administrator. Tap **OK**.

Start 10:26

Network Log On

Site: 172.16.0.1

User name: eden

Password: ****

Domain: example

Save password

OK Cancel

123 1 2 3 4 5 6 7 8 9 0 - = <

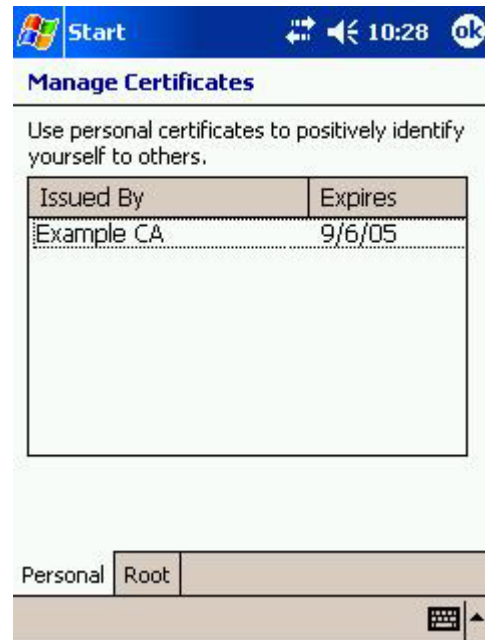
Tab q w e r t y u i o p []

CAP a s d f g h j k l ; ' <

Shift z x c v b n m , . / <

Ctl áü ` \ < > < >

- G. The program will generate a private key, stores it in its certificate store. It also generates a CSR and submits it to the Windows 2000/2003 server.
- H. The certificate gets issued. ENROLL.EXE should report "Cert Has Been Added Successfully". If you go to Settings → System → Certificates, the certificate should be listed. The root certificate should also be listed in the Root store.



- I. Disconnect the Pocket PC from the host PC.

Connect to WLAN

The Zero Configuration utility for Windows Mobile 2003 makes it quick and easy to connect to WLAN networks, including 802.1x. For more details on the utility, refer to the Windows Mobile 2003 manual. For help, tap **Start→Help**.

Whenever you insert the card, it will automatically start searching for: (1) any WLANs advertising their ESSIDs; and (2) any WLANs you have saved settings for. If your network administrator chose to not make the ESSID visible, you need to first enter and save network settings, then try to connect.

SCENARIO 1: The WLAN makes the ESSID visible.

1. A few seconds after you inserts the WLAN card, the Socket status icon will appear in the menu bar. Do not tap on the icon.
2. A few seconds to a minute later, a bubble should appear reporting detected WLANs. Select your WLAN and what it will connect to. Tap **Connect**.




*Note: In most cases, you should choose **The Internet**. If your network uses a VPN/proxy server, refer to the Windows Mobile 2003 manual for instructions.*

The bubble will not appear if you have enabled the "Automatically connect to non-preferred networks" setting, or if a connection already exists.

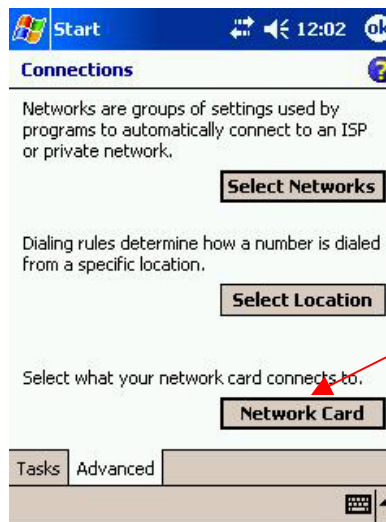
3. A User Logon screen will appear. Enter the **User name** and **Password** and tap **OK**.



4. When you have connected, the "x" will disappear from the connection icon at the top of the screen. 

SCENARIO 2: The WLAN does not make the ESSID visible.

1. Tap **Start** → **Settings** → **Connections** → **Connections** → **Advanced** → **Network Card**.



Tap
Network Card

*Note: If a bubble appears reporting detected WLANs, your WLAN may either appear as a blank option or not be listed at all. Tap **Hide**. If the bubble does list your WLAN's ESSID, then refer to Scenario 1 for instructions.*

2. In the Configure Wireless Networks screen, tap **Add New Settings...**

Tap
**Add New
Settings...**



3. In the General screen, enter the **Network name** (ESSID/SSID). Note that this name is case-sensitive. Select whether you want to connect to **The Internet** or **Work**.

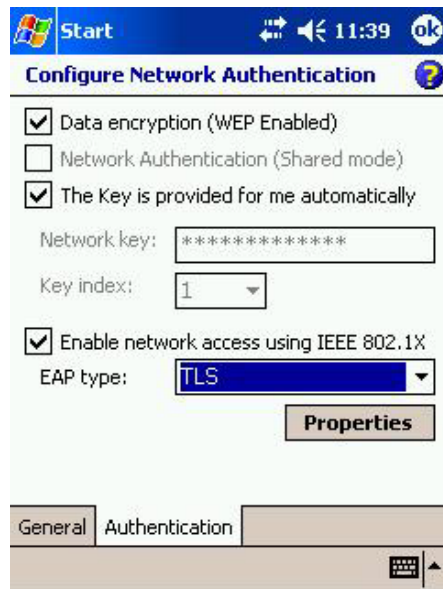


*Note: In most cases, you should select **The Internet**. If your network has a VPN/proxy server, refer to the Windows Mobile 2003 manual for instructions.*

4. Setup the security for your network.

■ **802.1x Network**

Tap on the **Authentication** tab. Enter the following:



- **Data encryption (WEP Enabled):** Check.
- **Network Authentication (Shared mode):** Uncheck.
- **The key is provided to me automatically:** Check.
- **Enable network access using IEEE 802.1x.** Check. Select the correct **EAP type** for your network.
- When done, tap **ok**.

■ WPA-PSK Networks

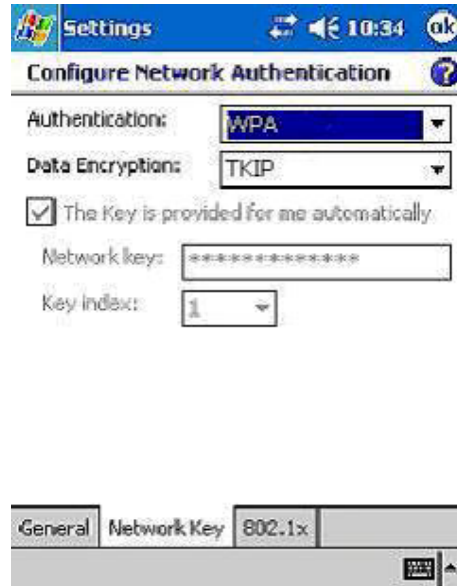
Note: Only apply on Windows Mobile 2003 Second Edition

- Tap on the **Network Key** tab. Enter the following:
- **Authentication: WPA-PSK.** And enter Network key. The key length must be either 64 hex or 8-63 ASCII characters.
- **Data encryption: select TKIP.**
- When done, tap **ok**.



■ WPA with RADIUS Network

- Tap on the **Network Key** tab. Enter the following:
- **Authentication:** select **WPA**. And check **"The key is provided for me automatically"**.
- **Data encryption:** select **TKIP**.




- Tap on **802.1x** tab, Enter the following:
- Check **"Use IEEE 802.1x network access control"**.
- EAP Type: **Select the type of EAP authentication used by your network, either PEAP or Smart Card or Certificate (EAP-TLS).**
- When done, tap **ok**.



5. The Configure Wireless Networks screen should appear, with your new network listed as **Unavailable**. Check **Automatically connect to non-preferred networks**. Tap **ok**.

Tap
**Automatically
connect to non-
preferred
networks**



6. Remove and re-insert the WLAN card. Wait for the device to automatically detect your WLAN. It may take between a few seconds to a minute.
7. When the bubble appears, select your WLAN. Tap **Connect**. When you have connected, the "x" will vanish from the connection icon. 

Note: If you encounter difficulties connecting to an 802.1x authentication server, please check your settings and repeat steps above.

7 Troubleshooting

Common Troubleshooting Tips

LED Activity

If you encounter difficulty using and/or installing your WL11-SD product, the error may be related to various causes:

- Out - of range situation, which prevents the WL11- SD Client from establishing a wireless connection with the network.
- Configuration mismatch, which prevents the WL11- SD Client from establishing a wireless connection with the (correct) network.
- Absence of, or conflict of the WL11- SD Driver.
- A problem or conflict with the WL11- SD Client socket from powering on.

A conflict of the WL11-SD hardware with another device

Table below provides an overview of the various modes of operation and the associated LED activity.

LED Activity Table

Power LED	Description/Action
Continuous Red	Standard operational mode No action is required
Off	WL11-SD Client power is not on, so it cannot transmit/receive data. The WL11-SD may not be connected properly. Actions□ <ul style="list-style-type: none">● Check WL11- SD connection.● Verify the device settings of the WL11- SD Client to determine the conflict with another device. If so, change the settings of either your WL11-SD Client or the conflicting device to resolve the problem.● Verify the versions of the driver and the WL11- SD Client firmware.● Visit our support website at□ http://www.ambicom.com to see if newer versions are available and if so, upgrade both the driver and WL11-SD firmware.

Cannot Connect To Network

If your AmbiCom WL11-SD seems to be working fine, but you are not able to connect to the network, this error might be due to a configuration mismatch. For example if LED of your WL11-SD Client lights, the problem is likely to be caused by a configuration mismatch of□

- Network Name
- Encryption Key (The WL11- SD Network Name is case- sensitive).
- Other causes may be:

- No driver loaded.
- Station not authorized to access network.
- WL11- SD Client defect

The most common cause is simple mistake. First check whether the card is inserted properly or not. If the card is inserted properly, the connection icon (antenna) should be displayed. If you see the icon, click that icon and check the status by clicking the status tab on the pop-up menu. Check whether any APs are available or not. If you see many APs, select any of one those APs and click connect. If you don't see any APs click refresh button. If you still don't see AP list after refreshing it is possible that no active AP is nearby. You may be in the dead zone. Move around or change the PDA orientations. It may help.

Cannot Edit Configuration Profile

If you want to add/edit the Configuration Profile of your WL11-SD Client but the Client Manager icon is not visible, you may do the following□

Insert the WL11-SD card into the device. The Client Manager should pop-up. If nothing happens, the driver is not installed. Install the driver and restart the device. You should see the WL11-SD icon in the lower right side.

Cannot Find the AP

Check the available Access Point in the neighborhood by clicking the wireless network tab in the utility. If the Access Point requires WEP key, input the same WEP key the try to connect again. If you do not know the WEP key, contact the system administrator to obtain the key.

For identifying the specific AP check the wireless networks available in the neighborhood. If the AP shows ESSID, use the same ESSID to connect the AP. ESSID is assigned to the specific AP for that purpose.

The System is Very Slow

Some devices with non-powerful CPU may suffer their performance significantly. If the system is very slow, check

- If you are opening many Windows, close them
- Change the antenna orientation for better signal reception
- Check the signal strength if it is weak move toward the AP.

Removing the Driver

1. In your PDA, go to Start, then Settings.
2. Tab on System Tab.
3. Tab on Remove Programs Icon.
4. A new Windows will open and showing the Installed programs in your PDA
5. Tab on AmbiCom **WL11-SD** and then tab the **Remove** button.
6. Tab **YES** when prompted.
7. Do soft reset your PDA for the system updates.